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AUTHOR Moore, JoAnne E.
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ABSTRACT

This paper presents findings of an investigation of some of the commonly held beliefs of educators concerning the relationships among five school variables and four measures of student achievement at 63 middle schools in the Detroit (Michigan) Public School system. The five school variables used were enrollment, number of short-term suspensions, number of disciplinary transfers, average daily attendance, and number of failures. The four achievement variables were scores on the reading comprehension and total mathematics subtests of the California Achievement Test, Form C, and the number of objectives achieved on the Michigan Educational Assessment Program criterion referenced test of basic skills in reading and mathematics. Most of the report consists of statistical analysis. Major qualitative findings include the following: (1) Small schools tend to have higher achievement scores and fewer disciplinary transfers. (2) Schools with lower enrollments tend to have better attendance. (3) Schools with fewer disciplinary transfers, higher attendance, and fewer failures tend to have higher achievement scores. (4) Chapter 1 schools have significantly fewer short-term suspensions and significantly lower reading achievement scores than non-Chapter 1 schools. (5) Open middle schools have lower enrollment, fewer suspensions, fewer disciplinary transfers, higher attendance, lower failure rates, and higher achievement scores than neighborhood schools. (6) Variables from the study can be used to predict some achievement test scores. (KH)

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JoAnne E. Moore, Ph.D.
Detroit Public Schools

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MIDDLE SCHOOL FOLKLORE: IT MAY BE TRUE!

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Background

The objective of this paper is to explore the relationships among five school variables and four measures of achievement for students at 63 middle schools in a large urban school district (Detroit Public Schools). The five school variables used in this study were enrollment, number of short term suspensions, number of disciplinary transfers, average daily attendance, and number of failures. The four achievement variables were scores on the reading comprehension and total mathematics subtests of the California Achievement Test, Form C, and the number of objectives achieved in reading and mathematics on the Michigan Educational Assessment Program criterion referenced test of basic skills in reading and mathematics. The CAT was administered in Grade 8, the MEAP in Grade 7. In addition to these variables, four additional variables were used in the study: Chapter 1 status of each school (did the school have students eligible for Chapter 1 programs), grade organization of the school (four patterns were possible: grades 6 thru 8, grades K thru 8, grades 5 thru 8, and grades 7 thru 9), type of attendance area (neighborhood schools have traditional attendance areas bounded by geographic considerations, open schools have enrollment from across the district), and a variable called size derived from the enrollment variable used to classify schools as small, medium, or large.

The purpose of the study reported in this paper was to explore some of the commonly held beliefs of educators concerning the relationships among these variables in an objective, data based manner. The school district from which these data were gathered has a long tradition of folklore related to the relationships among these variables. For example, it has long been believed that students with poor attendance will be most likely to fail. It has also been believed by many of the district's administrators that certain grade organization patterns result in higher achievement. These beliefs are not unique to this school district, but are frequently discussed among educators. Since data were available on a large number of schools at the same level in a single district, it was possible to use them to explore some of these folk beliefs to determine if they held up when actual data were used to test them.

Methodology

The methodology used in this study involved first obtaining school level measures on each of the variables. For the four achievement variables, this involved computing mean scores for each school. The other variables were collected at the school level. Each of the original variables, with the exception of enrollment, was converted to a T score (mean=50, s.d.=10). This permitted comparisons across variables and among schools. Chapter 1

status, grade organization, and type of attendance area were inherently categorical variables. Size was constructed from the enrollment figures by dividing the distribtuion of enrollments into three equal parts.

Once the school variables were converted to T scores, the statistical analyses involved several steps. First, descriptive statistics were computed for each of the categorical variables, including frequency distribtuions. Second, correlational analyses were conducted to explore relationships among all the variables. Finally, t-test and analysis of variance procedures were employed to compare groups of schools (based on the categorical variables) on each of the continuous measures. Regression was also used in order to attempt to explain variance in the achievement measures based on the other variables.

Data for this study were obtained from the district's student information system and test data files and appeared in the middle school profiles produced by the district. Data used in these analyses were from the 1984-1985 school year.

Descriptive Data

The variables used in this analysis were Chapter 1 status (CH1), school grade organization (ORG), open or neighborhood school status (OPEN), number of students enrolled (ENROL), short term suspensions (SUS), disciplinary transfers (DISTR), average daily attendance (AVGATT), failures (FAIL), grade 7 MEAP mathematics (MEAPMATH), grade 7 MEAP reading (MEAPREAD), grade 8 CAT mathematics (CATMATH), and grade 8 CAT reading (CATREAD). All these variables except enrollment were recorded in T scores. Enrollment was recorded as the actual number of students enrolled. An additional variable was computed in order to classify the 63 middle schools into three equal groups based upon enrollment. This variable was called SIZE.

There were 33 Chapter 1 schools and 30 non-Chapter 1 schools in the sample. There were 11 open schools and 52 neighborhood schools. The frequencies for each of the four types of school grade organization are presented in Table 1.

TABLE 1

School Grade Organization

Organization	Frequency	Percent
6 thru 8	46	73.0%
K thru 8	7	11.1
5 thru 8	5	7.9
7 thru 9	5	7.9
Total	63	100.0

The SIZE variable was created so that there would be 21 schools in each of the three groups. The cut-off values for enrollment to produce these three categories were: small, 1 through 691; medium, 692 through 902; and large, 903 and above.

Since all the variables on the Middle School Profile were expressed in T scores, the means of all these variables were approximately 50, and the standard deviations were 10.

Correlational Analyses

Since the intercorrelations of all the variables presented on the Middle School Profile were of interest, a correlation matrix was produced containing the correlation, number of cases, and probability of a correlation of the magnitude computed for each pair of variables. This matrix is presented in Table 2.

(TABLE 2 ABOUT HERE)

Regression Analyses

The first regression analysis involved using all the other variables in the profile to predict enrollment. This analysis was conducted to see if any of the variables in the profile was significantly related to enrollment. The results of the regression analysis indicated that none of the variables in the profile explained a significant proportion of the variance in enrollment among the schools.

The second regression analysis involved using the school data to predict the grade 7 MEAP mathematics scores. This regression analysis resulted in a regression equation which used DISTR, ENROL, and AVGATT to predict MEAPMATH. The equation was:

$$\text{MEAPMATH} = .297609(\text{DISTR}) - .009776(\text{ENROL}) + .286746(\text{AVGATT}) + 29.559155.$$

The R^2 for this equation was .55802, indicating that these three variables explained just over 55 percent of the variance in the MEAPMATH scores.

The third regression analysis involved using the school data to predict the grade 7 MEAP reading scores. This regression analysis resulted in a regression equation which used the same three variables (AVGATT, ENROL, and DISTR) to predict MEAPREAD. The equation was:

$$\text{MEAPREAD} = .407528(\text{AVGATT}) - .009055(\text{ENROL}) + .255508(\text{DISTR}) + 23.965024.$$

The R^2 for this equation was .54597, indicating that these three variables explained just over 54 percent of the variance in the MEAPREAD scores.

PEARSON CORRELATIONS

	CHI	ORG	OPEN	ENRO	SOS	DIST	AVGATT	FAIL	MEAPMATH	MEAPREAD	CAPMATH	CAPREAD	SIZE
CHI	1.0000 (0) P= .	.0549 (63) P= .335	.0638 (63) P= .310	.0015 (63) P= .495	.3653 (63) P= .002	.1080 (63) P= .200	.1934 (63) P= .064	.1768 (63) P= .083	.0970 (63) P= .225	.3110 (63) P= .003	.0790 (63) P= .269	.0884 (63) P= .245	.0389 (63) P= .381
ORG	.0549 (63) P= .335	1.0000 (0) P= .	.1995 (63) P= .058	.0763 (63) P= .276	.0366 (63) P= .388	.1039 (63) P= .209	.2307 (63) P= .034	.1724 (63) P= .088	.1403 (63) P= .136	.3030 (63) P= .008	.1845 (63) P= .074	.1488 (63) P= .122	.0864 (63) P= .250
OPEN	.0638 (63) P= .310	.1995 (63) P= .058	1.0000 (0) P= .	.4197 (63) P= .000	.4111 (63) P= .000	.5397 (63) P= .000	.6339 (63) P= .000	.5922 (63) P= .000	.7847 (63) P= .000	.8116 (63) P= .000	.6941 (63) P= .000	.7240 (63) P= .000	.4609 (63) P= .000
ENRO	.0015 (63) P= .495	.0763 (63) P= .276	.4197 (63) P= .000	1.0000 (0) P= .	.2338 (63) P= .033	.3378 (63) P= .003	.2525 (63) P= .023	.3181 (63) P= .006	.5365 (63) P= .000	.4887 (63) P= .000	.3751 (63) P= .001	.3615 (63) P= .002	.8879 (63) P= .000
SOS	.3653 (63) P= .002	.0366 (63) P= .388	.4111 (63) P= .000	.2338 (63) P= .033	1.0000 (0) P= .	.5651 (63) P= .000	.1882 (63) P= .070	.2791 (63) P= .013	.4312 (63) P= .000	.2656 (63) P= .018	.3548 (63) P= .002	.3950 (63) P= .001	.2814 (63) P= .013
DISTR	.1080 (63) P= .200	.1039 (63) P= .209	.5397 (63) P= .000	.3378 (63) P= .003	.5651 (63) P= .000	1.0000 (0) P= .	.3826 (63) P= .001	.5083 (63) P= .000	.5799 (63) P= .000	.5313 (63) P= .000	.5081 (63) P= .000	.5613 (63) P= .000	.3739 (63) P= .001
AVGATT	.1934 (63) P= .064	.2307 (63) P= .034	.6339 (63) P= .000	.2525 (63) P= .023	.1882 (63) P= .070	.3826 (63) P= .001	1.0000 (0) P= .	.6006 (63) P= .000	.5448 (63) P= .000	.6072 (63) P= .000	.6218 (63) P= .000	.6439 (63) P= .000	.2638 (63) P= .018
FAIL	.1768 (63) P= .083	.1724 (63) P= .088	.5922 (63) P= .000	.3181 (63) P= .006	.2791 (63) P= .013	.5083 (63) P= .000	.6006 (63) P= .000	1.0000 (0) P= .	.4780 (63) P= .000	.5569 (63) P= .000	.5182 (63) P= .000	.4515 (63) P= .000	.4032 (63) P= .001
MEAPMATH	.0970 (63) P= .225	.1403 (63) P= .136	.7847 (63) P= .000	.5365 (63) P= .000	.4312 (63) P= .000	.5799 (63) P= .000	.5448 (63) P= .000	.4780 (63) P= .000	1.0000 (0) P= .	.8139 (63) P= .000	.6804 (63) P= .000	.7306 (63) P= .000	.5747 (63) P= .000
MEAPREAD	.3110 (63) P= .003	.3030 (63) P= .008	.8116 (63) P= .000	.4887 (63) P= .000	.2656 (63) P= .018	.5313 (63) P= .000	.6072 (63) P= .000	.5569 (63) P= .000	.8139 (63) P= .000	1.0000 (0) P= .	.6771 (63) P= .000	.7361 (63) P= .000	.5606 (63) P= .000
CAPMATH	.0790 (63) P= .269	.1845 (63) P= .074	.6941 (63) P= .000	.3751 (63) P= .001	.3548 (63) P= .002	.5081 (63) P= .000	.6218 (63) P= .000	.5182 (63) P= .000	.6804 (63) P= .000	.6771 (63) P= .000	1.0000 (0) P= .	.8337 (63) P= .000	.3885 (63) P= .001
CAPREAD	.0884 (63) P= .245	.1488 (63) P= .122	.7240 (63) P= .000	.3615 (63) P= .002	.3950 (63) P= .001	.5613 (63) P= .000	.6439 (63) P= .000	.4515 (63) P= .000	.7306 (63) P= .000	.7361 (63) P= .000	.8337 (63) P= .000	1.0000 (0) P= .	.4149 (63) P= .000
SIZE	.0389 (63) P= .381	.0864 (63) P= .250	.4609 (63) P= .000	.8879 (63) P= .000	.2814 (63) P= .013	.3739 (63) P= .001	.2638 (63) P= .018	.4032 (63) P= .001	.5747 (63) P= .000	.5606 (63) P= .000	.3885 (63) P= .001	.4149 (63) P= .000	1.0000 (0) P= .

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TABLE 2

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The fourth regression analysis involved using the school data to predict the grade 8 CAT mathematics scores. This regression analysis resulted in a regression equation which used two of the three variables which appeared in the MEAP regression equations: AVGATT and DISTR. The equation was:

CATMATH = .467897(AVGATT) + .296521(DISTR) + 12.552473.

The R^2 for this equation was .47213, indicating that these two variables explained just over 47 percent of the variance in the CATMATH scores.

The fifth regression analysis involved using the school data to predict the grade 8 CAT reading scores. This regression analysis resulted in a regression equation which used the same two variables (AVGATT and DISTR) to predict CATREAD. The equation was:

CATREAD = .478266(AVGATT) + .353502(DISTR) + 8.976404.

The R^2 for this equation was .53080, indicating that these two variables explained just over 53 percent of the variance in the CATREAD scores.

t-Test Analyses

Comparisons based upon dichotomous variables were conducted using the t-test procedure for independent groups.

The first set of t-test comparisons involved comparing Chapter 1 schools with non-Chapter 1 schools on each of the Middle School Profile variables. Only two of these analyses resulted in significant differences. The first significant difference was in short term suspensions. The Chapter 1 middle schools had a significantly higher mean T score on this variable than the non-Chapter 1 middle schools. The results of this analysis appear in Table 3.

TABLE 3

t-Test Analysis Comparing Chapter 1 and Non-Chapter 1 Schools on the Suspensions Variable

Group	N of Cases	Mean	S.D.	t Value	df	Significance
Chapter 1	33	53.4242	8.504	3.06	61	$p < .01$
Non-Chapter 1	30	46.2000	10.193			

The non-Chapter 1 schools had a significantly higher mean T score on the grade 7 MEAP reading test than the Chapter 1 schools. The results of this analysis appear in Table 4.

TABLE 4

t-Test Analysis Comparing Chapter 1 and Non-Chapter 1 Schools on the Grade 7 MEAP Reading Test

Group	N of Cases	Mean	S.D.	t Value	df	Significance
Chapter 1	33	46.8182	9.088	-2.83	61	$p < .01$
Non-Chapter 1	30	53.2333	8.854			

The second set of t-test comparisons involved comparing middle schools that have open enrollment with neighborhood middle schools on each of the Middle School Profile variables. All nine of the comparisons were significant.

The first significant difference was in enrollment. The neighborhood middle schools had significantly more students enrolled than the open middle schools. The results of this analysis appear in Table 5.

TABLE 5

t-Test Analysis Comparing Open and Neighborhood Schools On Number of Students Enrolled

Group	N of Cases	Mean	S.D.	t Value	df	Significance
Open	11	525.6364	154.473	-3.61	61	$p < .01$
Neighborhood	52	857.2692	294.756			

The second significant difference was in short term suspensions. The open middle schools had a significantly higher mean T score for suspensions than the neighborhood middle schools. The results of this analysis appear in Table 6.

TABLE 6

t-Test Analysis Comparing Open and Neighborhood Schools On Short Term Suspensions

Group	N of Cases	Mean	S.D.	t Value	df	Significance
Open	11	58.8182	3.060	3.52	61	$p < .01$
Neighborhood	52	48.1154	9.915			

The third significant difference was in disciplinary transfers. The open middle schools had a significantly higher mean T score for disciplinary transfers than the neighborhood middle schools. The results of this analysis appear in Table 7.

TABLE 7

t-Test Analysis Comparing Open and Neighborhood Schools
On Disciplinary Transfers

Group	N of Cases	Mean	S.D.	t Value	df	Significance
Open	11	61.5455	2.339	5.01	61	$p < .01$
Neighborhood	52	47.5000	9.185			

The fourth significant difference was in average daily attendance. The open middle schools had a significantly higher mean T score for average daily attendance than the neighborhood middle schools. The results of this analysis appear in Table 8.

TABLE 8

t-Test Analysis Comparing Open and Neighborhood Schools
On Average Daily Attendance

Group	N of Cases	Mean	S.D.	t Value	df	Significance
Open	11	63.7273	4.563	6.40	61	$p < .01$
Neighborhood	52	47.1154	8.309			

The fifth significant difference was in failures. The open middle schools had a significantly higher mean T score for failures than the neighborhood middle schools. The results of this analysis appear in Table 9.

TABLE 9

t-Test Analysis Comparing Open and Neighborhood Schools
On Failures

Group	N of Cases	Mean	S.D.	t Value	df	Significance
Open	11	62.7273	6.769	5.74	61	$p < .01$
Neighborhood	52	47.3077	8.330			

The sixth significant difference was in grade 7 MEAP mathematics T scores. The open middle schools had a significantly higher mean T score for MEAPMATH than the neighborhood middle schools. The results of this analysis appear in Table 10.

TABLE 10

t-Test Analysis Comparing Open and Neighborhood Schools
On Grade 7 MEAP Mathematics

Group	N of Cases	Mean	S.D.	t Value	df	Significance
Open	11	65.7273	6.451	9.89	61	$p < .01$
Neighborhood	52	47.8269	5.238			

The seventh significant difference was in grade 7 MEAP reading T scores. The open middle schools had a significantly higher mean T score for MEAPREAD than the neighborhood middle schools. The results of this analysis appear in Table 11.

TABLE 11

t-Test Analysis Comparing Open and Neighborhood Schools
On Grade 7 MEAP Reading

Group	N of Cases	Mean	S.D.	t Value	df	Significance
Open	11	66.4545	6.990	10.85	61	$p < .01$
Neighborhood	52	46.3654	5.481			

The eighth significant difference was in grade 8 CAT mathematics T scores. The open middle schools had a significantly higher mean T score for CATMATH than the neighborhood middle schools. The results of this analysis appear in Table 12.

TABLE 12

t-Test Analysis Comparing Open and Neighborhood Schools
On Grade 8 CAT Mathematics

Group	N of Cases	Mean	S.D.	t Value	df	Significance
Open	11	64.6364	6.990	7.53	61	$p < .01$
Neighborhood	52	47.7115	6.728			

The ninth significant difference was in grade 8 CAT reading T scores. The open middle schools had a significantly higher mean T score for CATREAD than the neighborhood middle schools. The results of this analysis appear in Table 13.

TABLE 13

t-Test Analysis Comparing Open and Neighborhood Schools
On Grade 8 CAT Reading

Group	N of Cases	Mean	S.D.	t Value	df	Significance
Open	11	65.6364	9.689	8.20	61	$p < .01$
Neighborhood	52	47.4038	5.852			

Analyses of Variance

Comparisons based upon variables with three or more categories were tested using Analysis of Variance followed by Scheffé and/or Newman-Keuls procedures to determine significant differences among groups.

The first set of ANOVA procedures was used to compare the four school grade organization categories on each of the variables on the Middle School Profile. Of the nine analyses performed, only two resulted in significant differences among the four types of school grade organization.

The first significant difference was found on grade 7 MEAP mathematics. The results of the overall ANOVA appear in Table 14.

TABLE 14

ANOVA Summary Table for Grade 7 MEAP Mathematics Scores
By School Grade Organization

Source	df	Sum of Squares	Mean Square	F	Significance
Among Groups	3	939.7298	313.2433	4.8826	$p < .01$
Within Groups	59	3785.1273	64.1547		
Total	62	4724.8571			

The means and standard deviations for each of the four groups appear in Table 15.

TABLE 15

Means and Standard Deviations of Grade 7 MEAP Mathematics
Scores by School Grade Organization Group

Group	N	Mean	Standard Deviation
Grades 6 thru 8	46	49.5435	7.3233
Grades K thru 8	7	61.4286	11.2229
Grades 5 thru 8	5	52.8000	11.3004
Grades 7 thru 9	5	47.4000	5.1284

The results of the post hoc procedures indicate that the Grades K thru 8 organization had a significantly higher T score for MEAPMATH than both the Grades 7 thru 9 organization and the Grades 6 thru 8 organization. There was no significant difference between any other pairs of groups.

The second significant difference was found on grade 7 MEAP reading. The results of the overall ANOVA appear in Table 16.

TABLE 16

ANOVA Summary Table for Grade 7 MEAP Reading Scores By School Grade Organization

Source	df	Sum of Squares	Mean Square	F	Significance
Among Groups	3	1043.8164	347.9388	4.5425	$p < .01$
Within Groups	59	4519.1677	76.5961		
Total	62	5562.9841			

The means and standard deviations for each of the four groups appear in Table 17.

TABLE 17

Means and Standard Deviations of Grade 7 MEAP Reading Scores by School Grade Organization Group

Group	N	Mean	Standard Deviation
Grades 6 thru 8	46	47.6957	7.4412
Grades K thru 8	7	58.2857	13.6469
Grades 5 thru 8	5	58.0000	12.3085
Grades 7 thru 9	5	50.0000	8.7178

The results of the post hoc procedures indicate that the Grades 6 thru 8 organization had a significantly lower T score for MEAPREAD than both the Grades K thru 8 organization and the Grades 5 thru 8 organization. There was no significant difference between any other pairs of groups.

The second set of ANOVA procedures was used to compare the six areas on each of the variables on the Middle School Profile. Of the nine analyses performed, only two resulted in significant differences among the six areas.

The first significant difference was found in short term suspensions. The results of the overall ANOVA appear in Table 18.

TABLE 18

ANOVA Summary Table For Short Term Suspensions by Area

Source	df	Sum of Squares	Mean Square	F	Significance
Among Areas	5	1588.0575	317.6115	4.1609	$p < .01$
Within Areas	53	4045.6035	76.3321		
Total	58	5633.6610			

The means and standard deviations for each of the areas appear in Table 19.

TABLE 19

Means and Standard Deviations of Short Term Suspensions by Area

Area	N	Mean	Standard Deviation
Area A	12	53.9167	6.4167
Area B	9	50.0000	8.7321
Area C	11	45.9091	5.8899
Area D	9	56.7778	5.5852
Area E	9	47.5556	9.9387
Area F	9	40.6667	14.1244

The results of the post hoc analysis indicate that Area F had a significantly lower T score for suspensions than both Area A and Area D. There was no significant difference between any other pairs of areas.

The second significant difference was found in disciplinary transfers. The results of the overall ANOVA appear in Table 20.

TABLE 20

ANOVA Summary Table for Disciplinary Transfers by Area

Source	df	Sum of Squares	Mean Square	F	Significance
Among Areas	5	1352.1253	270.4251	3.5218	$p < .01$
Within Areas	53	4069.6035	76.7850		
Total	58	5421.7288			

The means and standard deviations for each of the areas appear in Table 21.

TABLE 21

Means and Standard Deviations of Disciplinary Transfers by Area

Area	N	Mean	Standard Deviation
Area A	12	55.2500	5.5124
Area B	9	49.6667	6.4614
Area C	11	48.0909	10.5210
Area D	9	53.1111	4.1667
Area E	9	45.7778	8.9691
Area F	9	40.6667	13.7477

The results of the post hoc analysis indicate that Area F had a significantly lower T score for disciplinary transfers than both Area A and Area D. There was no significant difference between any other pairs of areas.

The third set of ANOVA procedures was used to compare the three enrollment classifications (small, medium, and large) on each of the variables on the Middle School Profile. Of the eight analyses performed (since size was derived from the enrollment variable, no comparison on this variable was of interest), six were significant.

The first significant difference was found on the disciplinary transfer T scores. The results of the overall ANOVA appear in Table 22.

TABLE 22

ANOVA Summary Table for Disciplinary Transfers by School Size

Source	df	Sum of Squares	Mean Square	F	Significance
Among Groups	2	907.8095	453.9048	4.1963	$p < .01$
Within Groups	60	5241.0476	87.3508		
Total	62	5148.8571			

The means and standard deviations for each of the three groups appear in Table 23.

TABLE 23

Means and Standard Deviations of Disciplinary Transfer T Scores by School Size

Size	N	Mean	Standard Deviation
Small	21	55.0952	8.5668
Medium	21	48.7143	8.2834
Large	21	46.0476	10.9566

The results of the post hoc procedures indicate that the small schools had a significantly higher T score for disciplinary transfers than the large schools. There was no significant difference between any other pairs of mean T scores.

The second significant difference was found in failures. The results of the overall ANOVA appear in Table 24.

TABLE 24

ANOVA Summary Table for Failures by School Size

Source	df	Sum of Squares	Mean Square	F	Significance
Among Groups	2	1006.3810	503.1905	5.8628	$p < .01$
Within Groups	60	5149.6190	85.8270		
Total	62	6156.0000			

The means and standard deviations for each of the three groups appear in Table 25.

TABLE 25

Means and Standard Deviations of Failure T Scores by School Size

Size	N	Mean	Standard Deviation
Small	21	54.6667	10.4083
Medium	21	50.4286	9.2172
Large	21	44.9048	8.0119

The results of the post hoc procedures indicate that the small schools had a significantly higher T score for failures than the large schools. There was no significant difference between any other pairs of mean T scores.

The third significant difference was found in grade 7 MEAP mathematics. The results of the overall ANOVA appear in Table 26.

TABLE 26

ANOVA Summary Table for Grade 7 MEAP Mathematics T Scores By School Size

Source	df	Sum of Squares	Mean Square	F	Significance
Among Groups	2	1753.5238	876.7619	17.7044	$p < .01$
Within Groups	60	2971.3333	49.5222		
Total	62	4724.8571			

The means and standard deviations for each of the three groups appear in Table 27.

TABLE 27

Means and Standard Deviations of Grade 7 MEAP Mathematics T Scores by School Size

Size	N	Mean	Standard Deviation
Small	21	58.2857	9.3496
Medium	21	48.4762	6.2819
Large	21	46.0952	4.6573

The results of the post hoc procedures indicate that the small schools had a significantly higher T score for grade 7 MEAP mathematics than either the medium or large schools. There was no significant difference between any other pairs of mean T scores.

The fourth significant difference was found in grade 7 MEAP reading. The results of the overall ANOVA appear in Table 28.

TABLE 28

ANOVA Summary Table for Grade 7 MEAP Reading T Scores By School Size

Source	df	Sum of Squares	Mean Square	F	Significance
Among Groups	2	1876.6032	938.3016	15.2719	$p < .01$
Within Groups	60	3686.3810	61.4397		
Total	62	5562.9841			

The means and standard deviations for each of the three groups appear in Table 29.

TABLE 29

Means and Standard Deviations of Grade 7 MEAP Reading T Scores by School Size

Size	N	Mean	Standard Deviation
Small	21	57.3333	20.0017
Medium	21	47.8571	6.8868
Large	21	44.4286	6.0710

The results of the post hoc procedures indicate that the small schools had a significantly higher T score for grade 7 MEAP reading than either the medium or large schools. There was no significant difference between any other pairs of mean T scores.

The fifth significant difference was found in grade 8 CAT mathematics. The results of the overall ANOVA appear in Table 30.

TABLE 30

ANOVA Summary Table for Grade 8 CAT Mathematics T Scores
By School Size

Source	df	Sum of Squares	Mean Square	F	Significance
Among Groups	2	683.5238	441.7619	4.8713	$p < .01$
Within Groups	60	4514.4762	75.2413		
Total	62	5398.0000			

The means and standard deviations for each of the three groups appear in Table 31.

TABLE 31

Means and Standard Deviations of Grade 8 CAT
Mathematics T Scores by School Size

Size	N	Mean	Standard Deviation
Small	21	55.8095	11.0843
Medium	21	49.1905	8.3224
Large	21	47.0000	5.7966

The results of the post hoc procedures indicate that the small schools had a significantly higher T score for grade 8 CAT mathematics than the large schools. There was no significant difference between any other pairs of mean T scores.

The sixth significant difference was found in grade 8 CAT reading. The results of the overall ANOVA appear in Table 32.

TABLE 32

ANOVA Summary Table for Grade 8 CAT Reading T Scores
By School Size

Source	df	Sum of Squares	Mean Square	F	Significance
Among Groups	2	1127.0894	563.5397	7.4865	$p < .01$
Within Groups	60	4516.4762	75.2746		
Total	62	5643.5556			

The means and standard deviations for each of the three groups appear in Table 33.

TABLE 33

Means and Standard Deviations of Grade 8 CAT Reading T Scores by School Size

Size	N	Mean	Standard Deviation
Small	21	56.4762	11.5482
Medium	21	48.3333	7.8060
Large	21	46.8571	5.6150

The results of the post hoc procedures indicate that the small schools had a significantly higher T score for grade 8 CAT reading than either the medium or large schools. There was no significant difference between any other pairs of mean T scores.

It should be noted that all of the Open Middle Schools were classified as "small." This may be a confounding effect in some of these results.

Discussion

The results of the correlational analyses produced results in keeping with those expected.

The Chapter 1 variable was significantly correlated with suspensions ($r=-.3653$) and MEAP reading scores ($r=.3410$).

The organization variable was significantly correlated with attendance ($r=.2307$) and MEAP reading ($r=.3030$).

The open variable was significantly correlated with enrollment ($r=.4197$), suspensions ($r=-.4113$), disciplinary transfers ($r=-.5397$), attendance ($r=-.6339$), failures ($r=-.5922$), MEAP mathematics ($r=-.7847$), MEAP reading ($r=-.8116$), CAT mathematics ($r=-.6941$), and CAT reading ($r=-.7240$).

The enrollment variable was also significantly correlated with suspensions ($r=-.2338$), disciplinary transfers ($r=-.3378$), attendance ($r=-.2525$), failures ($r=-.3181$), MEAP mathematics ($r=-.5365$), MEAP reading ($r=-.4887$), CAT mathematics ($r=-.3751$), and CAT reading ($r=-.3615$).

The suspensions variable was also significantly correlated with disciplinary transfers ($r=.5651$, failures ($r=.2791$), MEAP mathematics ($r=.4312$), MEAP reading ($r=.2656$), CAT mathematics ($r=.3548$), and CAT reading ($r=.3950$).

Disciplinary Transfers were also significantly correlated with attendance ($r=.3826$), failures ($r=.5083$), MEAP mathematics ($r=.5799$), MEAP reading ($r=.5313$), CAT mathematics ($r=.5081$), and CAT reading ($r=.5613$).

Attendance was also significantly correlated with failures (r=.6006), MEAP mathematics (r=.5448), MEAP reading (r=.6072), CAT mathematics (r=.6218), and CAT reading (r=.6439).

Failures were also significantly correlated with MEAP mathematics (r=.4780), MEAP reading (r=.5569), CAT mathematics (r=.5182), and CAT reading (r=.4515).

MEAP mathematics was also significantly correlated with MEAP reading (r=.8139), CAT mathematics (r=.6804), and CAT reading (r=.7306).

MEAP reading was also significantly correlated with CAT mathematics (r=.6771) and CAT reading (r=.7461).

CAT mathematics was also significantly correlated with CAT reading (r=.8337).

The results of the regression analyses indicated that both the MEAP mathematics and MEAP reading scores could be predicted by three school variables: disciplinary transfers, enrollment, and average daily attendance. The two CAT scores, mathematics and reading, could be predicted by two of the school variables: average daily attendance and disciplinary transfers. In all four cases, these variables explained approximately half of the variance in the achievement scores.

The t-test analyses uncovered significant differences between Chapter 1 and non-Chapter 1 schools in suspensions and MEAP reading scores. Open and neighborhood schools differed significantly in enrollment, suspensions, disciplinary transfers, average daily attendance, failures, MEAP reading, MEAP mathematics, CAT mathematics, and CAT reading.

The results of the Analysis of Variance comparisons indicated that the grade organizations of the middle schools differed in MEAP mathematics performance (K thru 8 organized schools performed best) and MEAP reading performance (K thru 8 and 5 thru 8 organized schools out-performed the other groups). The six Areas differed in suspensions and disciplinary transfers (Area F had significantly more suspensions and disciplinary transfers than Areas A and D). Small schools had fewer disciplinary transfers, fewer failures, and higher CAT mathematics scores than large schools. Small schools had higher MEAP mathematics, MEAP reading, and CAT reading scores than both medium and large schools. (Caution should be exercised in interpreting the results of analysis by size since all of the Open Middle Schools were classified as small and this may have a confounding effect on these results.)

Conclusions

Based upon the analyses presented above, several interesting conclusions can be drawn.

1. Small schools tend to have higher achievement scores than either medium or large schools. (This may be due to the fact that all of the open middle schools were classified as small.)

2. Small schools have fewer disciplinary transfers than larger schools.

3. Enrollment and attendance are related: schools with lower enrollments tend to have better attendance.

4. Schools with fewer disciplinary transfers tend to have higher achievement scores.

5. Schools with higher attendance tend to have higher achievement scores.

6. Schools with fewer failures tend to have higher achievement scores.

7. Chapter 1 schools have significantly fewer short term suspensions than non-Chapter 1 schools.

8. Chapter 1 schools have significantly lower MEAP reading scores than non-Chapter 1 schools.

9. Open middle schools have lower enrollments, fewer suspensions, fewer disciplinary transfers, higher attendance, lower failure rates, and higher achievement scores than neighborhood middle schools.

10. Middle schools with K thru 8 enrollment patterns tend to have higher MEAP scores than other patterned schools. Middle schools with 5 thru 8 enrollment patterns did as well as the K thru 8 schools on MEAP reading.

11. Areas A and D had significantly fewer suspensions and disciplinary transfers than Area F. The other Areas were not significantly different. (Areas A and D and Area F were at the two extremes of the distribution of scores; the other Areas were between them.)

12. MEAP scores can be predicted using three variables from the study: disciplinary transfers, enrollment, and attendance. These three variables account for over 50 percent of the variance in MEAP scores.

13. CAT scores can be predicted using two of the variables from the study: disciplinary transfers and attendance. These two variables account for approximately 50 percent of the variance in CAT scores.

None of the conclusions listed above comes as a suprise to veterans of the middle school/ junior high scene. Conventional wisdom would have predicted most of the outcomes.

All educators argue for smaller schools on the basis of manageability. Examination of the findings of this study indicates that smaller schools have higher achievement scores, fewer disciplinary transfers, better attendance, and fewer failures.

One of the most popular statements made by educators concerns attendance and achievement: "I can't teach them if they aren't here!" The data from this study confirm the relationship between these two variables: schools with low attendance rates have low achievement and those with high attendance have high achievement.

Another common belief among educators is that schools that enroll students who choose to attend that school (or who's parents choose it) will have more successful students. The results of this study support this belief. Open middle schools had lower enrollments, fewer suspensions, fewer disciplinary transfers, higher attendance, lower failure rates, and higher achievement scores than neighborhood middle schools.

Some educators feel that middle grade students will perform better if they are not separated from their lower grade school mates. This belief is given support by the data from this study. Middle schools with K thru 8 enrollment patterns tend to have higher MEAP scores than other patterns.

Behavior, attendance, and school size are frequently cited variables when educators are asked to give areas which will improve achievement. The results of this study support this belif. The MEAP scores can be predicted using disciplinary transfers, enrollment, and attendance. These three variables account for over 50 percent of the variance in MEAP scores. The CAT scores can be predicted using disciplinary transfers and attendance. These two variables account for approximately 50 percent of the variance in CAT scores.

It appears, then, that much of the folklore about middle schools may be true. Based on the data from the this study, many of the myths that have been passed on from one generation of educators to another may, indeed, be based in fact.